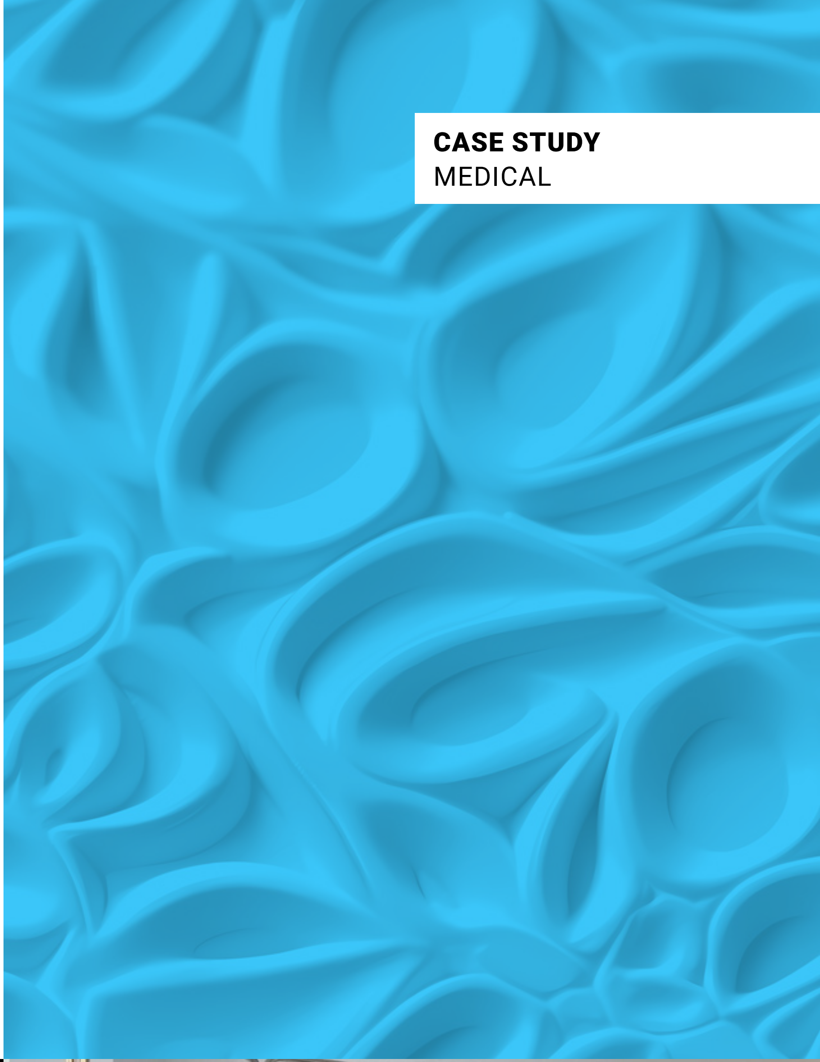
CASE STUDY
MEDICAL



Accelerating Innovation of Ultrasound Diagnostics with 3D Printed Phantoms

How EndoCure is Using Stratasys Digital Anatomy™ Models to Validate Revealan™ Performance in Early-Stage Cancer and Endometriosis Detection

The Challenge:

40,000,000 diagnostic errors involving imaging, annually, worldwide

(Source: Fundamentals of Diagnostic Error in Imaging)

EndoCure, a healthcare diagnostics startup based in Israel, was founded to close a longstanding unmet need of ultrasound use – the operator dependency. They initially focus on women's health, and specifically the accurate, timely detection of endometriosis, a disease in which lesions similar to the lining of the uterus grow outside the uterus, often causing severe pelvic pain and impacting fertility. Globally, the average time to diagnose the disease is 10 years. It's a condition that progresses silently, often eluding detection by traditional imaging modalities such as MRI, CT, or ultrasound, due to the small dimensions of the lesions. Each modality has limitations: MRI is costly and typically misses lesions smaller than 5 mm; CT involves radiation exposure; and ultrasound, while more accessible, also fails to detect small lesions because it is dependent on operator expertise and real-time interpretation.

To address this, EndoCure developed a proprietary autonomous robotic ultrasound platform that transforms manual, operator-dependent off-the-shelf ultrasound into a fully automated, objective, high-density volumetric imaging tool, without relying on highly specialized personnel. The system, Revealan™, delivers high-resolution, standardized, reproducible imaging, capturing thousands of frames with micrometer-level precision. It replicates MRI-style imaging by separating the data acquisition from the interpretation, at 10x the resolution (off-plane), and in a fraction of the time.

But a challenge remained: How to validate the technology's true detection capability.

> “Manual ultrasound is like searching for a needle in a haystack. Even the best sonographers struggle to identify small lesions, and access to specialists is limited.”
>
> **Shiran Golan**
> VP of R&D at EndoCure

The Solution:

Custom 3D-Printed Phantoms for Ultrasound

The EndoCure team initially turned to off-the-shelf ultrasound phantoms to test the technology but quickly ran into limitations. These costly commercial models lacked the ability to simulate small lesions or replicate the complex tissue properties needed for validating their system. They were not designed with known geometries, and crucially, didn't reflect the specific anatomical conditions EndoCure was targeting.

> “
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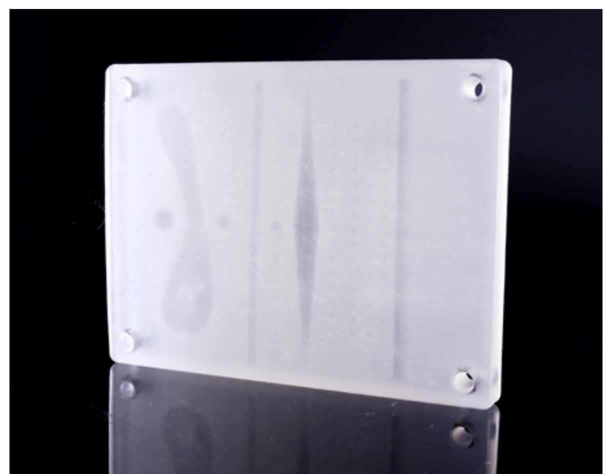
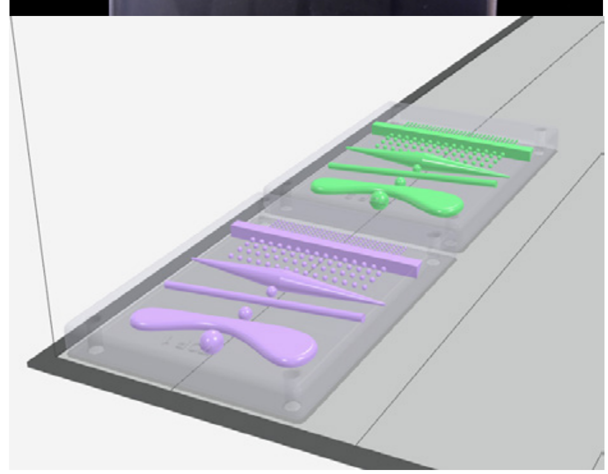
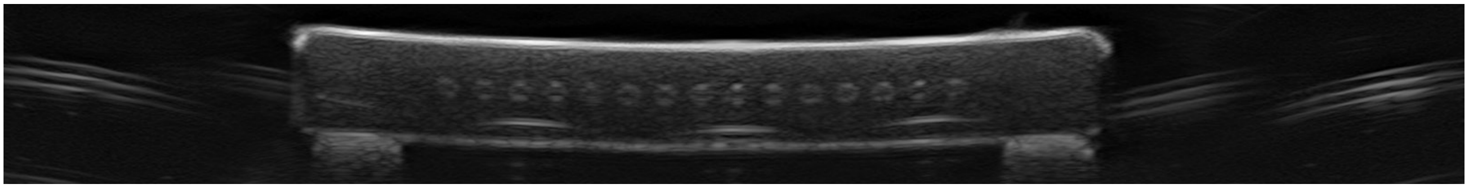
> Our first models were homemade: we sliced tomatoes in half and looked at the small grains, mimicking small pathologies. That's how far we had to improvise. What Stratasys offered was a game-changing leap forward in reproducibility and anatomical fidelity.”
>
> **Dr. Hadas Ziso**
> Founder and CEO of EndoCure

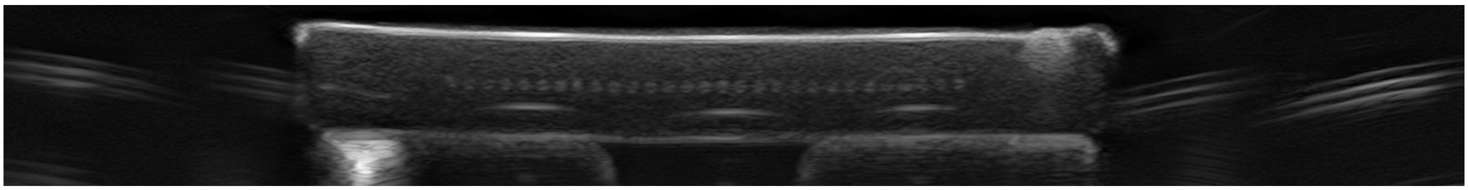
Working with Stratasys engineers, the EndoCure team co-developed multi-material phantoms using the J850™ Digital Anatomy™ Printer. The phantom models incorporated spherical targets of various diameters embedded in tissue-like material blocks designed to behave similarly to human soft tissue when viewed under ultrasound. These models were specifically engineered to provide realistic grayscale feedback and contrast, essential for accurate imaging and diagnostic benchmarking.

“Off-the-shelf phantoms don't represent the conditions we're trying to detect,” says Golan. “Stratasys allowed us to build exactly what we needed: not only phantoms that look like the human body but ones that behave like it under ultrasound imaging.”









The Results:

Objective Feedback and a Benchmarking Breakthrough

The 3D printed phantoms enabled EndoCure to:

- **Demonstrate early-stage lesion detection** at sub-millimeter resolution
- **Quantify system accuracy** against known geometries
- **Decrease operator dependency**, a major limitation of manual ultrasound
- **Accelerate clinical trial readiness** with consistent, repeatable testing models

The ability to simulate complex anatomical features in a controlled environment also opened new pathways for software optimization. EndoCure has since developed additional phantoms with tighter target spacing, irregular organic shapes, and varying lesion depths to challenge and refine their image recognition algorithms.

In controlled tests using patient-matched scenarios, manual ultrasound consistently fails to detect lesions smaller than 5mm, missing the smallest targets entirely. In contrast, EndoCure's robotic system scanning over the Stratasys phantom at 4 mm/sec accurately detected every lesion, including those as small as 1 mm balls; their OBGYN, who scanned the same phantom manually with the same ultrasound transducer, failed to detect the 1 mm lesion. This not only demonstrated the enhanced sensitivity of the platform but also underscored the importance of stability, consistency, and precise geometry in achieving sub-millimeter resolution.

“

The phantom gave us definitive proof of what our system can do. It validated our approach, helped answer tough feasibility questions, and set the stage for more advanced clinical testing.”

Shiran Golan
VP of R&D at EndoCure

The Technology:

PolyJet™ and Digital Anatomy™

To simulate lesion contrast under ultrasound, Stratasys combined TissueMatrix™, Agilus™, and GelMatrix™ with support material SUP706B™, fine-tuning the internal composition for optimal differentiation. The multi-material capability of the J850™ Digital Anatomy™ Printer allowed engineers to embed lesions with varied stiffness and echogenicity within soft-tissue-like phantoms.

"We gradually refined the material mixtures, improving ultrasound visibility with each iteration. Using the Digital Anatomy Creator™ helped us adjust parameters easily, until we reached the formulation that met EndoCure's exact needs."

Reut Reina
Senior Application Engineer at Stratasys.

The Impact:
A New Standard for Diagnostic Development

With their first human clinical trials underway, EndoCure is already leveraging the 3D-printed phantoms as part of their R&D process, and are planning to use them for the FDA submission V&V process. Every product update or software change can now be benchmarked against a repeatable, gold-standard reference model.

The EndoCure team is now working to create full anatomical models for training, clinical demonstrations, and advanced testing, aiming to simulate realistic grayscale values for organs and pathologies.

“We’re just getting started,” says Dr. Ziso. “This collaboration gave us confidence, credibility, and a path forward to bring better diagnostics to more patients.”

Materials and Methods

Printer Used:
Stratasys J850™ Digital Anatomy™ Printer

Materials Used:
TissueMatrix™, Agilus™, GelMatrix™, SUP706B™

Application:
Ultrasound phantom development for lesion detection benchmarking

Use Case:
Diagnostic validation, FDA verification, and clinical training

Learn how Stratasys Digital Anatomy™ solutions are accelerating clinical validation, training, and innovation in women’s health and beyond at stratasys.com/medical/.

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